SPECIFICATION

BALLOON, CAP STRUCTURE OF BALLOON, BALLOON STORAGE BOX AND BALLOON VENDING MACHINE

TECHNICAL FIELD

The present invention relates to a balloon vending machine, a balloon made as of aluminum to be stored in the balloon vending machine, a cap structure of the balloon, and a balloon storage box.

BACKGROUND ART

Conventionally known balloons are rubber ones whose surfaces are colored or printed with various patterns, letters or the like for the purpose of advertisement or publicity. The rubber balloons are inflated with helium or similar gas to great volumes, but uninflated balloons are compact and occupy little space for storage before use; hence, the balloons have the advantage of space savings.

When hitting a snag, however, the rubber balloon may sometimes burst with comparative ease. On this account, when used for advertising or publicity, the balloon has the disadvantage that the short service life will weaken the effectiveness of advertising or publicity.

On the other hand, attention is recently focused on aluminum (for example, ? ylar) balloons harder to burst than the rubber balloon. There is known an aluminum balloon of the type that is comprised mainly of: an aluminum balloon body which is inflated with helium or similar gas into substantially spherical form; a tube extending from one portion of the balloon body and closed at the free end; a gas inlet port made in the tube intermediately

of the latter; and a check valve disposed in the tube intermediate the gas inlet port and the balloon body. This balloon is designed such that, when removing a gas injector of a gas cylinder from the gas inlet port after blowing a predetermined amount of gas into the balloon body from the gas cylinder, the check valve closes to prevent leakage of gas; thus, the balloon is free from the need for gas inlet port closing means, and hence it is easy to use accordingly.

After being inflated with gas to provide buoyancy, the aluminum balloon of this kind is prevented from flying away by use of a string, wire or similar cord attached to the tube of the balloon. Despite using the cord to prevent the balloon from flying away, however, since the gas filled in the balloon is usually lighter than air, there is a fear that if care is not taken, the cord readily slips away from a user's hand, allowing the balloon to go up high and fly away, impairing advertising or publicity effectiveness.

Furthermore, since no vending machine is available from which aluminum balloons can be dispensed one by one, it is necessary, at present, to inflate them with gas one by one for distribution or for sale.

The inventor and applicant of this application have diligently searched for patent or non-patent documents on conventional balloon vending machines relevant to the present invention, but they have not found such documents at the time of filing this application.

The present invention is intended to solve such problems as listed below.

The invention is to provide: a balloon cap structure that permits automatic inflation of a balloon with gas; a balloon that is provided with the cap structure and can be prevented from flying away after being inflated with gas for buoyancy; a balloon storage box for storing such balloons; and a balloon vending machine from which the balloons can be dispensed one by one for

distribution or for sale.

DISCLOSURE OF THE INVENTION

The cap structure for a balloon according to the present invention comprises: a metal balloon body to be inflated with gas into substantially spherical form; a tube extending from one portion of the said balloon body, communicating with the inside of said balloon body and closed at the free end; a gas inlet made in said tube; and a check valve disposed in said tube intermediate said gas inlet and said balloon body; further including a gas injecting cap detachably mounted on said gas inlet port, and a cord fixed at one end to said cap and at the other end to said tube.

With the above cap structure, the balloon can efficiently be inflated with gas injected thereinto through the cap, and the balloon rendered buoyant by the injected gas can be efficiently prevented from flying away by the cord and the cap removed from the balloon.

The cap structure for the balloon according to the present invention has the above construction in which said cap includes a substantially cylindrical cap body, a gas injection port made in said cap body centrally thereof, and a cord winding portion formed about the periphery of said cap body, and when said cap is removed from said gas inlet port, said gas injection port of said cap serves as finger grip means for holding said balloon through said cord unwound from said cord winding portion.

With the above arrangement, the gas injection port of the cap removed from the balloon of which gas pressure is maintained by the check valve after injection of gas serves as finger grip means, by which the balloon can be held through the cord, making it possible to effectively prevent the gas-filled and hence buoyant balloon from flying away.

The cap structure for the balloon according to the present invention has the above construction in which said cap body of said cap has a planar end face on one side facing said tube and a planar end face on the other side opposite from said tube.

With the above arrangement, in the case of stacking caps of multiple balloons, it is possible to store many stacked balloons in a small space.

The cap structure for the balloon according to the present invention further includes, in the above construction, a seal sandwiched between said cap and said tube. A first adhesive layer is formed on one side of said seal for detachably attaching said cap to said tube, and a second adhesive layer is formed on the other side of said seal for fixing the other end of said cord to said tube.

With the above arrangement, by distinguishing the adhesive for bonding the tube of the balloon and the cap, and the adhesive for bonding the tube of the balloon and the cord, it is possible to select the adhesive corresponding to the adhesion strength required for each bonding.

The cap structure for the balloon according to the present invention has the above construction in which said seal includes an annular sealing member of about the same shape as said one-side end face of said cap body of said cap and having first and second adhesive layers, and a tab extending from said sealing member and having formed thereon only said second adhesive layer.

With the above arrangement, such reduced area of bonding between the seal and the cap facilitates the removal of the cap from the tube of the balloon, while at the same time the increased area of bonding between the seal and the cord makes it hard to disengage the cord from the tube of the balloon.

The cap structure for the balloon according to the present invention has the above construction in which the other end of said cord is fixed to said tube

by said second adhesive layer formed on said sealing member of said seal and the portion of said cord in vicinity of said other end thereof is fixed to said tube by said second adhesive layer formed on said tab.

With the above arrangement, the other end portion of the cord can be firmly fixed to the tube of the balloon by the second adhesive layer of the tab, ensuring prevention of the balloon from flying away. Furthermore, since the other end portion of the cord is fixed to the second adhesive layer formed on both of the sealing member and the tab, the gas-filled and hence buoyant balloon can be held upright, by which when the balloon bears displays for advertisement or publicity, the intended advertising or publicity effectiveness can fully be achieved.

The cap structure for the balloon according to the present invention has the above construction in which said cap has a groove indicating the position where to stick said sealing member of said seal to said cap body by said first adhesive layer.

With the above arrangement, it is possible to accurately stick the sealing member of the seal to the cap body through utilization of the groove, ensuring prevention of the gas inlet port of the balloon from partial closure by misregistration of the seal.

The cap structure for the balloon according to the present invention has the above construction in which said cap has a notch made in said cap body and a cord hole for tying thereto one end of said cord in said cord winding portion at a position accessible from said notch.

With the above arrangement, one end of the cord can easily tied to the cord hole during fabrication.

The cap structure for the balloon according to the present invention has the above construction in which said cap has a small-diameter potion for

holding the tip end portion of a gas injector of a gas injection means in said gas injection port.

With the above arrangement, when the tip end portion of the gas injector of the gas injection means is inserted into the gas injection port of the cap, the gas can be introduced through the gas injector into the gas inlet port of the balloon to efficiently prevent leakage of gas.

The balloon according to the present invention has the above-described cap structure.

With the above-described cap structure, it is possible to offer a balloon which can be inflated the by efficient injection thereinto of gas through the cap and which can effectively be prevented by the cap and the cord from flying away after inflated with gas for buoyancy.

The balloon storage box according to the present invention is designed so that such balloons as mentioned above are arranged in folded form with their caps stacked.

With the above arrangement, it is possible to dispense the balloons one by one in order of stacking from uppermost to lowermost. Further effect is that compact storage of the stacked balloons achieved by folding the balloons enables increase of the storage amount of the balloons.

The balloon vending machine according to the present invention is provided with: balloon arrangement means for arranging multiple caps of said balloons in registered form; balloon selecting means for selecting at least one of said balloons arranged by said balloon arrangement means; balloon transfer means for holding and transferring the cap of said balloon selected by said balloon selecting means from said balloon arrangement means to a predetermined position; gas injection means for injecting gas through said cap into said balloon transferred by said balloon transfer means to said

predetermined position; balloon receiving mean for receiving said cap of said balloon inflated with gas by said gas injection means into substantially spherical form; balloon dispensing means for dispensing said balloon held by said balloon receiving means; and control means for controlling the operations of said balloon transfer means, said gas injection means, said balloon receiving means and said balloon dispensing means on the basis of the selection by said balloon selecting means.

With the above arrangement, it is possible to provide a balloon vending machine from which selected balloons can be taken out one by one in inflated form.

The balloon vending machine according to the present invention has the above construction in which said balloon arrangement means arranges the caps with the balloons stacked.

With the above arrangement, the balloons can be taken out one by one in order of stacking.

The balloon vending machine according to the present invention has the above construction in which said balloon arrangement means is provided with a storage section in which folded balloons are arranged with said caps stacked.

With the above arrangement, the balloons can be taken out one by one in order of stacking, and folded balloons stacked in layers can be stored compactly, making it possible to increase the amount of storage of balloons.

The balloon vending machine according to the present invention has the above construction in which said balloon selecting means is provided with a display panel for indicating display contents of balloons arranged by said balloon arrangement means, and selecting operation parts corresponding to the display contents indicated on said display panel.

With the above arrangement, it is possible for a user to take out the

desired balloon without fail.

The balloon vending machine according to the present invention has the above construction in which said balloon transfer means is provided with a cap holder which fits in the cap of the balloon, and said gas injection means includes a gas injector formed integrally with said cap holder of said balloon transfer means, a gas reservoir for storing gas, and a gas supply passage for supplying gas from said gas reservoir to said gas injector.

With the above arrangement, it is possible to ensure the injection of gas into the balloon transferred by said balloon transfer means and to perform smooth and quick operations for transfer of the balloon and injection of gas thereinto, permitting reduction of the user's waiting time.

The balloon vending machine according to the present invention has the above construction in which said balloon receiving means is provided with a cap catching member for catching the balloon cap on the outer side thereof.

With the above arrangement, the balloon held by the balloon transfer means can be gripped on the outside the cap, not the inside thereof. This permits smooth and fast transfer of the balloon from the balloon transfer means to the balloon receiving means, reducing the user's waiting time.

The balloon vending machine according to the present invention has the above construction in which said balloon dispensing means includes a chamber for accommodating a substantially spherical balloon held by said balloon receiving means, and a door member for opening said chamber in association with the operation for catching the balloon cap by said balloon receiving means.

With the above construction, by opening the chamber, it is possible to inform the user that the balloon can be taken out of the chamber and to allow the user to take out the balloon with ease.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view showing the whole structure of a balloon according to Embodiment 1 of the present invention.

Fig. 2 is a plan view showing the body of the balloon depicted in Fig. 1.

Fig. 3 is a top plan view showing a cap of the balloon depicted in Fig. 1.

Fig. 4 is a sectional view taken along the line IV-IV in Fig. 3.

Fig. 5 is a bottom view showing the cap of the balloon depicted in Fig. 1.

Fig. 6 is a block diagram illustrating the configuration of a balloon vending machine suitable for dispensing balloons of the Fig. 1 configuration one by one.

Fig. 7 is a front view showing the outward appearance of the balloon vending machine depicted in Fig. 6.

Fig. 8 is a front view showing the inner workings of the balloon vending machine depicted in Fig. 6.

Fig. 9 is a top view showing the turning range of a balloon transfer arm of the balloon vending machine depicted in Fig. 8.

Fig. 10 is a front view showing a plurality of balloon stacking members to be stored in the balloon vending machine depicted in Fig. 8.

Fig. 11 is an enlarged perspective view showing a part of the balloon stacking member depicted in Fig. 10.

Fig. 12 is a perspective view showing chucking of a cap to a balloon carried by the balloon transfer arm in the balloon vending machine depicted in Fig. 8.

Fig. 13 is a sectional view showing the balloon transfer arm and the inside of the cap during the chucking operation depicted in Fig. 12.

Fig. 14 is a perspective view illustrating rotational movement of the balloon transfer arm and blowing of gas into the balloon after the chucking operation depicted in Fig. 13.

Fig. 15 is a perspective view showing how to take out the balloon after the gas-blowing operation depicted in Fig. 14.

Fig. 16 is a perspective view showing the usage pattern of the balloon taken out as depicted in Fig. 15.

Fig. 17 is a plan view showing the whole structure of a balloon according to Embodiment 2 of the present invention.

Fig. 18 is a bottom view showing the bottom of a cap attached to the balloon depicted in Fig. 17.

Fig. 19 is a plan view showing the configuration of a seal to be held between a tube and the cap of the balloon depicted in Fig. 17.

Fig. 20 is a perspective view showing a first adhesive layer coated on the seal of Fig. 19.

Fig. 21 is a perspective view showing a second adhesive layer coated on the seal of Fig. 19.

Fig. 22 is a bottom view showing the bottom of the cap stuck with the seal of Fig. 19.

Fig. 23 is an exploded perspective view showing the positional relationship between the cap and seal depicted in Fig. 22 and how to attach a cord to the cap.

Fig. 24 is a front view illustrating the inner workings of a balloon vending machine suitable for dispensing balloons of Fig. 17 one by one by one.

Fig. 25 is a top view showing the range of rotational movement of a balloon transfer arm of the balloon vending machine depicted in Fig. 24.

Fig. 26 is a plan view showing a folded balloon stored in the balloon

vending machine of Fig. 24.

Fig. 27 is a top view showing a balloon storage box in which balloons folded as depicted in Fig. 26 are stacked and stored.

Fig. 28 is a sectional view taken along the line XXVI-XXVI in Fig. 27.

BEST MODE FOR CARRYING OUT THE INVENTION

To facilitate a better understanding of the present invention, a detailed description will hereinafter be given, with the accompanying drawings, of the best mode for carrying out the invention.

EMBODIMENT 1

Fig. 1 is a perspective view illustrating the whole structure of the balloon according to Embodiment 1 of the present invention; Fig. 2 is a plan view showing the body of the Fig. 1 balloon; Fig. 3 is a top view of a cap of the Fig. 1 balloon; Fig. 4 is a sectional view taken along the line IV-IV in Fig. 3; Fig. 5 is a bottom view showing the cap of the Fig. 1 balloon; Fig. 6 is a block diagram illustrating the configuration of a balloon vending machine suitable for dispensing balloons of Fig. 1 one by one; Fig. 7 is a front view showing the outward appearance of the Fig. 6 balloon vending machine; Fig. 8 is a front view illustrating the inner workings of the balloon vending machine suitable for dispensing balloons of Fig. 1 one by one; Fig. 9 is a top view showing the range of rotational movement of a balloon transfer arm of the Fig. 8 balloon vending machine; Fig. 10 is a front view showing a plurality of balloon stacking members to be accommodated in the balloon vending machine depicted in Fig. 8; Fig. 11 is an enlarged perspective view showing one of the balloon stacking members depicted in Fig. 10; Fig. 12 is a perspective view showing chucking of a cap to a balloon carried by the balloon transfer arm in the Fig. 8 balloon vending machine; Fig. 13 is a sectional view showing the

balloon transfer arm and the inside of the cap during the chucking operation depicted in Fig. 12; Fig. 14 is a perspective view illustrating rotational movement of the balloon transfer arm and blowing of gas into the balloon after the chucking operation depicted in Fig. 13; Fig. 15 is a perspective view showing how to take out the balloon after the gas-blowing operation depicted in Fig. 14; and Fig. 16 is a perspective view showing the usage pattern of the balloon taken out as depicted in Fig. 15.

As shown in Figs. 1 to 5, the balloon 1 according to Embodiment 1 is composed of: a metal balloon body 3 that is inflated with an inert gas, such as helium gas, into substantially a spherical form; a tube 5 extending from one portion of the balloon body 3; a circular gas inlet port 7 made in the tube 5; a check valve 9 placed in the tube 5 intermediate the gas inlet port 7 and the balloon body 3 to prevent a backward current of a predetermined amount of gas blown into the balloon body 3 through the gas inlet port 7; a gas-injection cap 11 detachably mounted on the gas inlet port 7; and a cord 13 fixed at one end to the cap 11 and at the other end to the tube 5. The tube 5 is closed at its end portion 5a on the side opposite from the balloon body 3. Incidentally, known adhesives can be used for connecting the cord 13 to the cap 11 and the tube 5, but it is preferable to use an adhesive of relatively high adhesion strength in view of the effect of preventing the balloon 1 from flying away.

The cap 11 is composed mainly of a substantially cylindrical cap body 15, a gas injection port 17 made in the cap body 15 axially centrally thereof, and a cord winding portion 19 formed concave radially inwardly about the periphery of the cap body 15, around which the cord 13 is wound.

The cap body 15 of the cap 11 has a planar bottom (one end face) 15a to be bonded to the outer surface of the tube 5 surrounding the gas inlet port 7 and a planar top (the other end face) 15b apart from the tube 5; the cap body 15 has

a notch 21 formed on a portion thereof, and in the cord winding portion 19 at the position accessible from the notch 21 there is formed a cord hole 23 through which to tie one end 13a of the cord 13. The gas injection port 17 has a small-diameter portion 17a for holding the tip end portion of a gas injector of the gas injection means described later on. Incidentally, known adhesives can be used for bonding the tube 5 and the cap 11 but, taking into account their disengagement after the inflation of the balloon with gas, it is preferable to use an adhesive of relatively low adhesion strength.

The cap 11 of such a construction is detachably bonded to the gas inlet port 7 of the tube 5 of the balloon 1. When the cap 11 is removed from the gas inlet port 7 after the injection of gas into the balloon, the cord 13 wound around the cord winding portion 19 is rewound therefrom to a long length so that a user may hold the cap 11 in its entirety through the extended cord 13, thereby making it possible to prevent that the balloon 1 now inflated with gas for buoyancy flies higher than required. The gas injection port 17 of the cap 11 forms circular finger grip means especially convenient for hooking a user's finger.

Next, a description will be given of the configuration of a balloon vending machine 31 suitable for dispensing balloons 1 on a one-by-one basis.

As shown in Fig. 6, the balloon vending machine 31 according to Embodiment 1 is composed of balloon selecting means 40, balloon arrangement means 50, balloon transfer means 60, gas injection means 70, balloon receiving means 80, balloon dispensing means 90, control means 100, and a power supply 110. Each means will be concretely described below.

The balloon selecting means 40 has, as shown in Fig. 7, a display panel 41 mounted on the front of a cabinet 33 constructing the outer configuration of the balloon vending machine 31 and indicating display contents of balloons

stored in the cabinet 33, and a plurality of balloon selecting buttons (selecting operation parts) 43 corresponding to the display contents of the display panel 41. The balloon selecting buttons 43 are each provided in correspondence to the kinds of the balloons stored in the balloon vending machine 31, and in the vicinity of each balloon selecting button 43 there is indicated the kind of the balloon corresponding to the balloon selecting button 43. Upon insertion of coin of a predetermined amount of money in a coin slot 45 made in the front of the cabinet 33 as well, the balloon selecting buttons 43 light up, enabling a user to select all the balloons stored in the balloon vending machine 31. When one of the balloon selecting buttons 43 is pressed by the user, a series of operations will start for dispending the balloon corresponding to the pressed button 43 as described later on.

The balloon arrangement means 50 is formed by a plurality of balloon stacking members disposed in the cabinet 33. Each balloon stacking member 51 is configured such that multiple caps 11 of unfolded balloons 1, with the balloon bodies 3 yet to be inflated with gas, are stacked vertically in a space defined by four stacking rods 53 planted upright on a substantially L-shaped base plate 52 as shown in Fig. 11.

The balloon transfer means 60 includes generally, as shown in Figs. 8 and 9, a cap holder 61 to be fit in the gas injection port 17 of the cap 11 of the balloon 1, and a transfer arm 63 carrying the cap holder 61 at its tip end. The transfer arm 63 is vertically (the downward direction being indicated by the arrow A in Fig. 12) slidably supported on a support shaft 65 planted upright on the cabinet 33, while at the same time the arm 63 is designed to be horizontally rotatable over a predetermined range of angles. The cap holder 61 has formed therein a gas injector 71 for injecting gas into the balloon body 3 through the gas injection port 17 of the cap 11; the cap holder having a nozzle-like

configuration as a whole. The gas injector 71 is connected to a gas reservoir 75 via a tubular gas supply passage 73 formed in he transfer arm 63. The gas reservoir 75 is a gas cylinder disposed in the cabinet 33 to store helium or similar inert gas. The gas injector 71, the gas supply passage 73 and the gas reservoir 75 constitute the gas injection means 70. On the outside of the cap holder 61 at the tip end portion there is mounted an O-ring 67 for providing enhanced hermeticity in the contact between the gas injector 71 and the gas injection port 17. In the gas supply passage 73 there is disposed an automatic open/close control valve (not shown) held under the control of the control means 100.

In this embodiment, the balloon stacking members 51, which form the above-mentioned balloon arrangement means 50, are each disposed in such a manner that the caps 11 of the balloons 1 stacked in the space defined by the stacking rods 53 are located on the circumference of rotation of the transfer arm 63 as shown in Fig. 9. In Embodiment 1, as depicted in Fig. 10, three balloon storage sections 37 are displaced at predetermined intervals on the circumference of rotation of the transfer arm 63, and such balloon storage sections are stacked in three layers. The transfer arm 63 is adapted so that it moves down from above the stacking rods 53 and catches the stacked caps 11 of the balloons 1 in a sequential order and that after catching the uppermost cap 11 it goes up to dispense one balloon 1 having the cap 11. To this end, the four stacking rods 53 are divided into two pairs, which are arranged in parallel about the center of rotation of the transfer arm 63, and spacing of the stacking rods 53 is set according to the geometry of the gas injector 71 located at the tip end portion of the transfer arm 63 as described later on.

The balloon receiving means 80 is formed by a cap catching arm (a catching member) 81 that catches the cord winding portion 19 of the cap 11 of

the balloon 1 transferred by the transfer arm 63 having turned in the direction indicated by the arrow B in Fig. 14. The cap catching arm 81 is disposed in a cylindrical chamber 91 in the cabinet 33. The chamber 91 is openable in two directions through a contra-rotatable door (a door) 93. That is, the chamber is designed so that when the cap catching arm 81 of the balloon receiving means 80 catches the cap 11 of the balloon 1 held by the cap holder 61 of the transfer arm 63, the door opens on the side near the balloon transfer means 60 while closing a substantially rectangular opening 95 formed in the front of the cabinet 33, and that after receiving the balloon, the door closes on the side near the balloon transfer means 60, allowing the chamber to be open to the outside through the opening 95. The contra-rotatable door 93 is composed of two doors smaller in diameter than the chamber 91, and the inner and outer doors are each contra-rotatable in the direction indicated by the arrow C or D in Fig. 15. The chamber 91 and the opening 95 are set large enough to take in or out therethrough the balloon 1 inflated with gas. The chamber 91, the contra-rotatable door 93 and the opening 95 constitute the balloon dispensing means 90.

The control means 100 is disposed in the cabinet 33 at the top thereof, and it has a storage section 101 for storage of the correspondence between the balloon selecting means 40 and the balloon arrangement means 50. The control means 100 is a microcomputer that responds to a select signal from the balloon selecting means 40 to drive and control the balloon transfer means 60, the gas injection means 70, the balloon receiving means 80 and the balloon dispensing means 90, which performs a sequence of operations for the selected balloon 1, that is, operations for transfer, inflation with gas, receiving and dispensing of the balloon 1.

The power supply 110 is to supply power to the balloon transfer means

60, the gas injection means 70, the balloon receiving means 80, the balloon dispensing means 90 and the control means 100, and the power supply is usually placed outside the cabinet 33. When the balloon vending machine 31 is used outdoors, the power supply 110 may be a portable in-house power generator.

Next, the operation of the balloon vending machine will be described below.

In the first place, a plurality of balloon stacking members 51, such as shown in Fig. 11, is placed in the cabinet 33 of the balloon vending machine 31 as depicted in Fig. 8. Then, after inserting a coin of a required amount of money in the coin slot 45 formed in the front of the balloon vending machine 31, a user presses a select button (not shown) for selecting the desired kind of balloon 1. At this time, in the cabinet 33 the transfer arm 63 turns as shown in Fig. 9, or moves vertically, to the position just above the balloon stacking member 51 corresponding to the pressed select button (not shown).

Then, the transfer arm 83 descends toward the cap 11 of the desired balloon 1 in the direction indicated by the arrow A in Fig. 12, by which the gas injector 71 of the transfer arm 63 is inserted into the gas injection port 17 of the cap 11, and the tip end portion of the gas injector 71 is tightly fitted in the gas injection port 17 by the O-ring 67 on the outside of the tip end portion of the gas injector 71 (chucking operation). At this stage, gas injection is not performed yet.

Next, when the balloon 1 is brought into the chamber 91 by the rotational movement of the transfer arm 63 through a predetermined angle in the direction indicated by the arrow B in Fig. 14, the cap 11 transferred by the transfer arm 63 is caught by the cap catching arm 81in the balloon dispensing means 90. Then, helium or similar gas is fed from the gas reservoir 75 to the

tip of the gas injector 71 through the gas supply passage 73 in the transfer arm 63 and is blown into the balloon body 3 via the check valve 9 from the gas inlet port 7 of the balloon 1 now held in communication with the gas injection port 17, inflating the balloon body 3 into a predetermined substantially spherical form (gas injecting operation). During the gas injecting operation the contra-rotatable door 93 of the balloon dispensing means 90 is closed and protrudes outwardly of the cabinet 33 as shown in Fig. 9.

Next, the contra-rotatable door 93 is turned in the direction of the arrow C in Fig. 15 to open the opening 95, and the inflated balloon 1 is taken out of the chamber 91 through the opening 95. Then, the cap 11 of the thus taken out balloon 1 is removed from the tube 5 by a user, and the cord 13 is unwound from the cord winding portion 18, and the gas injection port 17 of the cap 11 fixed to the lower end of the cord is used as a finger grip by the user.

As described above, according to Embodiment 1, the balloon is configured to includes the balloon body 3 to be inflated with gas into substantially spherical form, the tube 5 extending from a part of the balloon body 3 and closed at its end 5a, the gas inlet port 7 formed in the tube 5, the check valve disposed in the tube 5 intermediate the gas inlet port 7 and the balloon body 3, the gas injecting cap 11 detachably mounted on the gas inlet port 7, and the cord 13 fixed at one end to the cap 11 and at the other end to the tube 5. Accordingly, the cap 11 removed from the balloon of which gas pressure is maintained by the check valve 9 after the injection of gas can be used as a finger piece as a whole to hold the balloon 1 through the cord 3, producing the effect of ensuring prevention of the gas-filled and hence buoyant balloon 1 from flying away.

According to Embodiment 1, the cap 11 includes the substantially cylindrical cap body 15 , the gas injection port 17 bored through the cap body

15 centrally thereof, and the cord winding portion 19 formed about the periphery of the cap body 15. When the cap 11 is removed from the gas inlet port 7, the gas injection port 17 of the cap 11 serves as finger grip means for holding the balloon 1 through the cord 13 unwound from the cord winding portion 19. Thus, the gas injection port 17 of the cap 11 disengaged from the balloon 1 of which gas pressure is maintained by the check valve 9 after the injection of gas functions as finger grip means, enabling a user to hold the balloon 1 via the cord 13, producing the effect of ensuring prevention of the gas-filled and hence buoyant balloon 1 from flying away.

According to Embodiment 1, the cap body 15 of the cap 11 has the planar end face 15a on the side near the tube 5 and the planar end face 15b on the side opposite thereto, and hence, by stacking the caps 11 attached to multiple balloons 1, it is possible to store a large number of stacked balloons in a small space.

According to Embodiment 1, the cap 11 has the notch 21 in the cap body 15, and in the cord winding portion 19 at the position accessible from the notch 21 there is formed the cord hole 23 through which to tie one end of the cord 13 to the cap, allowing ease in tying one end of the cord 13 to the cap through the cord hole 23 during fabrication.

According to Embodiment 1, since the small-diameter portion 17a is provided in the gas injection port 17 of the cap 11 to support the tip end portion of the gas injector 71 of the gas injection means, the cap holder 61 of the balloon transfer means 60 can securely be fitted in the gas injection portion 17 of the cap 11. This ensures leak-free introduction of gas into the gas inlet port 7 of the balloon 1 from the gas injector 71 held in the cap holder 61.

According to Embodiment 1, the balloon vending machine is provided with the balloon arrangement means 50 for arranging multiple caps 11 of

balloons 1, the balloon selecting means 40 for selecting one of the balloons 1 arranged by the balloon arrangement means 50, the balloon transfer means 60 for holding and transferring the cap 11 of the balloon 1 selected by the balloon selecting means 40 from the balloon arrangement means 50 to a predetermined position, the gas injection means 70 for injecting gas through the cap 11 into the balloon 1 transferred by the balloon transfer means 60 to the predetermined position, the balloon receiving means 80 for receiving the cap 11 of the balloon inflated with gas by the gas injection means 70 into substantially spherical form, the balloon dispensing means 90 for dispensing the balloon 1 held by the balloon receiving means 80, and the control means 100 for controlling the operations of the balloon transfer means 50, the gas injection means 70, the balloon receiving means 80 and the balloon dispensing means 90 on the basis of the selection by the balloon selecting means 40. Therefore, the balloon vending machine is capable of dispensing, one by one, user's desired balloons 1 in inflated form.

According to Embodiment 1, since the balloon stacking members 51 are provided for arranging in layers the caps 11 of stacked balloons 1, it is possible to dispense the balloons 1 one by one in order of stacking from uppermost to lowermost.

According to Embodiment 1, since the balloon selecting means 40 is provided with the display panel 41 indicating display contents of the plurality of balloons 1 arranged by the balloon arrangement means 50 and the select buttons 43 corresponding to the display panel 41, it is possible for the user to take out the desired balloon 1 without fail.

According to Embodiment 1, since the balloon transfer means 60 has the cap holder 61 which fits into the cap 11 of the balloon 1, and the gas injection means 70 has the gas injector 71 formed integrally with the cap holder

61 of the balloon transfer means 60, the gas reservoir 75 for storing gas and the gas supply passage 73 for supplying therethrough the gas from the gas reservoir 75 to the gas injector 71, it is possible to ensure required gas injection into the balloon 1 transferred by the balloon transfer means 60 and to perform the transfer of the balloon 1 and the inflation of the balloon 1 with gas smoothly and rapidly, permitting reduction of the user's waiting time.

According to Embodiment 1, since the balloon receiving means 80 is provided with the cap catching arm 81 for catching the cap 11 of the balloon 1 on the outer side thereof, the balloon 1 held by the balloon transfer means 60 can be gripped one the outer side the cap 11, not the inside thereof. This permits smooth and fast transfer of the balloon from the balloon transfer means 60 to the balloon receiving means 80, reducing the user's waiting time.

According to Embodiment 1, the balloon dispensing means 90 includes the chamber 91 for accommodating a substantially spherical balloon 1 held by the balloon receiving means 80, and the contra-rotatable door 93 for opening the chamber 91 in association with catching of the cap 11 of the balloon 1 by the balloon receiving means 80. Therefore, by opening the chamber 91, it is possible to inform the user that the balloon 1 can be taken out of the chamber and to allow the user to take out the balloon 1 with ease.

EMBODIMENT 2

Fig. 17 is a plan view showing the whole structure of the balloon according to Embodiment 2 of the present invention; Fig. 18 is a bottom view showing the bottom of the cap secured to the balloon of Fig. 17; Fig. 19 is a plan view showing the configuration of a seal to be sandwiched between a tube and the cap of the balloon depicted in Fig. 17; Fig. 20 is a perspective view showing a first adhesive layer formed on the seal of Fig. 19; Fig. 21 is a

perspective view showing a second adhesive layer formed on the seal of Fig. 19; Fig. 22 is a bottom view showing the bottom of the cap stuck with the seal of Fig. 19; Fig. 23 is an exploded perspective view showing the positional relationship between the cap and seal shown in Fig. 22 and how to tie a cord to the cap; Fig. 24 is a front view illustrating the inner workings of a balloon vending machine suitable for dispensing balloons of Fig. 17 one at a time; Fig. 25 is a top view showing the range of rotational movement of a balloon transfer arm of the balloon vending machine depicted in Fig. 24; Fig. 26 is a plan view showing folded balloons to be stored in the balloon vending machine of Fig. 24; Fig. 27 is a top view showing a balloon storing box in which the folded balloons depicted in Fig. 26 are stored in stacked layers; and Fig. 28 is a sectional view taken along the line XXVI-XXVI in Fig. 27. Incidentally, those of constituent elements of Embodiment 2 which correspond to those in Embodiment 1 are identified by the same reference numerals as those in the latter and no description will be given of them.

A feature of Embodiment 2 resides in that a seal 171 held between the cap 11 and the tube 5 is included in the balloon 1. The seal 171 is formed, as shown in Fig. 19, by an annular sealing member 173 and a tab 175 extending from the sealing member 173. The sealing member 173 has formed centrally thereof a central hole 173a which communicates with the gas injection port 17 of the cap 11. On the other hand, in the bottom 15a of the cap 11 there is cut, as shown in Figs. 18 and 22, an annular groove 177 for positioning the sealing member 173 of the seal 171.

On one side of the sealing member 173 of the seal 171 there is coated a first adhesive layer 179 as depicted in Fig. 20. On the other side of each of the sealing member 173 and the tab 175 there is coated a second adhesive layer 181 as shown in Fig. 21. The first and second adhesive layers 179 and 181 can be

formed using known adhesives, and the same adhesive may be used for the both adhesive layers; however, the first adhesive layer 179 may preferably be formed using an adhesive of relatively low adhesion strength in view of easy removal of the cap 11 from the tube 5, whereas the second adhesive layer 181 may preferably be formed using an adhesive of relatively high adhesion strength since firm fixing of the cord 13 and the tube 5 can be expected to prevent the balloon 1 from flying away.

Next, a description will be given below of the configuration of the balloon vending machine 31 suitable for dispensing balloons 1 one by one.

The balloon vending machine 31 of this embodiment differs from Embodiment 1 in the method of arranging balloons. That is, a balloon storage member (a balloon storage box) 183 of the balloon vending machine 31 is adapted such that balloons 1 with balloon bodies 3 folded in substantially rectangular form as shown in Fig. 26 are stacked in, for example a paper box 185 as shown in Figs. 27 and 28. The box 185 has a lid 187 and during distribution it is covered with the lid and packaged, but when it is stored in the balloon vending machine 31, the lid 187 is cut off the box 185. In the balloon vending machine 31 there are stored four rows of such balloon storage members 183 stacked in five layers as shown in Fig. 24, and one row of the balloon storage members 183 is disposed with the caps 11 of their stored balloons 1 held on the circumference of rotational movement of the transfer arm 63. Since the operations of this balloon vending machine 31 are the same as in Embodiment 1, no description will be repeated.

According to Embodiment 2, the balloon further includes the seal 171 sandwiched between the cap 11 and the tube 5, and on one side of the seal 171 there is formed the first adhesive layer 179 by which the cap 11 is detachably mounted on the tube 5, and on the other side of the seal 171 there is formed the

second adhesive layer 181 for fixing the cord 13 to the tube 5. Thus, by distinguishing the adhesive for bonding the tube 5 of the balloon 1 and the cap 11, and the adhesive for bonding the tube 5 of the balloon 1 and the cord 13, it is possible to select the adhesive corresponding to the adhesion strength required for each bonding.

According to Embodiment 2, the seal 171 includes the annular sealing member 173 of about the same shape as one end face of the cap body 15 of the cap 11 and having the first and second adhesive layers 178 and 181, and the tab 175 extending from the sealing member 173 and having only the second adhesive layer 181. Such reduced area of bonding between the seal 171 and the cap 11 facilitates the removal of the cap 11 from the tube 5 of the balloon 1, while at the same time the increased area of bonding between the seal 171 and the cord 13 makes it hard to disengage the cord 13 from the tube 5 of the balloon 1.

According to Embodiment 2, the other end of the cord 13 is fixed to the tube 5 by the second adhesive layer 181 formed on the sealing member 173 of the seal 171, and the portion of the cord 13 in vicinity of the other end thereof is fixed to the tube 5 by the second adhesive layer 181 formed on the tab 175. Therefore, the other end portion of the cord 13 can be firmly fixed to the tube 5 of the balloon 1 by the second adhesive layer 181 of the tab 175, ensuring prevention of the balloon 1 from flying away. Furthermore, since the other end portion of the cord 13 is fixed to the second adhesive layer 181 formed on both of the sealing member 173 and the tab 175, the gas-filled and hence buoyant balloon can be held upright, by which when the balloon 1 bears displays for advertisement or publicity, the intended advertising or publicity effectiveness can fully be achieved.

According to Embodiment 2, since the cap 11 has the positioning

groove 177 for sticking the sealing member 173 of the seal 171 to the cap body 15 by the first adhesive layer 179, it is possible to accurately stick the sealing member 173 of the seal 171 to the cap body through utilization of the groove 177, ensuring prevention of the gas inlet port 7 of the balloon 1 from partial closure by misregistration of the seal 171.

According to Embodiment 2, since the balloon vending machine is provided with the balloon storage section (the balloon storing box) 183 in which folded balloons 1 are arranged with their caps 11 stacked, the balloons 1 can be dispensed one by one in order of stacking, and folding of the balloons 1 enables the stacked balloons 1 to be stored in compact form, increasing the amount of storage of balloons 1. While in Embodiment 2 the balloons 1 each provided with the seal 171 are stored in folded form in the balloon vending machine 31 shown in Fig. 24, they may also be stored in the balloon vending machine 31 depicted in Fig. 8; conversely, the balloons 1 according to Embodiment 1 may be stored in folded form in the balloon vending machine 31 shown in Fig. 24.

INDUSTRIAL APPLICABILITY

As described above, the balloon vending machine according to the present invention can be used to distribute or sell, for example, aluminum balloons automatically inflated with gas one by one.